

CLAIMS

What is claimed is:

1. An apparatus, comprising:
a receiver in receipt of a signal having a plurality of pseudo noise codes with each of the pseudo noise codes of the plurality of pseudo noise codes originate from a GPS transmitter;
a clock with an error of less than 0.5 ms relative to a GPS time; and
a decoder connected to the receiver and the clock that identifies four pseudo range equations for at least four GPS transmitters from the plurality of GPS transmitters, and determines a location of the receiver by simultaneously solving the four pseudo range equations.
2. The apparatus of claim 1, wherein a plurality of chips make up each pseudo noise code in the plurality of pseudo noise code and the plurality of chips is offset between 511 chips before a pseudo noise code boundary and 512 chips after the pseudo noise code boundary.
3. The apparatus of claim 2, wherein each of the pseudo range (PR) equations when the pseudo noise code boundary is less than 512 and an estimated range is R, a chip from the plurality of chips transmitted at T time C_k is received at the receiver as a chip C_j that is offset from an expected chip \hat{C}_j , and L_{chip} is a distance that the signal propagates in one chip time ($c/1.023e6 = 293.0522561$ m), is;

$$PR = R - (C_j - \hat{C}_j)L_{chip}.$$

4. The apparatus of claim 2, wherein each of the pseudo range (PR) equations when the pseudo noise code boundary is greater than 511 and has an estimated range R , a chip from the plurality of chips transmit at T time C_k , received at the receiver as a chip C_j that is offset from an expected chip \hat{C}_j , and L_{chip} being a distance that the signal propagates in one chip time ($c/1.023e6 = 293.0522561$ m), is;

$$PR = R + \lfloor 1023 - (C_j - \hat{C}_j) \rfloor L_{chip}.$$

5. The apparatus of claim 1, wherein a time error in the clock is identified and corrected upon the determination of the location of the receiver is correct.

6. The apparatus of claim 1, further comprising:
a temperature sensor attached to a crystal in the clock to take heat measurements of the crystal and reports heat measurements to the decoder to enable the decoder to adjust the clock readings in response to heat measurements.

7. A method, comprising:
receiving at a receiver a signal generated at a plurality of GPS transmitters;
identifying at least four pseudo noise codes in the signal at the receiver;
calculating time with a clock having an error of less than 0.5 ms relative to a GPS time;
deriving at least four pseudo range equations from each of the at least four pseudo noise codes; and
locating the receiver by solving the at least four pseudo range equations simultaneously.

8. The method of claim 7, further comprises:

solving each of the at least four pseudo range equations when the pseudo noise code boundary is less than 512 and an estimated range is R , a chip from the plurality of chips transmitted at T time C_k is received at the receiver as a chip C_j that is offset from an expected chip \hat{C}_j , and L_{chip} is a distance that the signal propagates in one chip time ($c/1.023e6 = 293.0522561$ m), is;

$$PR = R - (C_j - \hat{C}_j) L_{chip} .$$

9. The method of claim 7, further comprising:

solving each of the pseudo range (PR) equations when the pseudo noise code boundary is greater than 511 and has an estimated range R , a chip from the plurality of chips transmit at T time C_k , received at the receiver as a chip C_j that is offset from an expected chip \hat{C}_j , and L_{chip} being a distance that the signal propagates in one chip time ($c/1.023e6 = 293.0522561$ m), is;

$$PR = R + \lfloor 1023 - (C_j - \hat{C}_j) \rfloor L_{chip} .$$

10. An apparatus, comprising:

means for receiving at a receiver a signal generated at a plurality of GPS transmitters;
 means for identifying at least four pseudo noise codes in the signal at the receiver;
 means for calculating time with a clock having an error of less than 0.5 ms relative to a GPS time;
 means for deriving at least four pseudo range equations from each of the at least four pseudo noise codes; and

means for locating the receiver by solving the at least four pseudo range equations simultaneously.

11. The apparatus of claim 10, further comprises:

means for solving each of the at least four pseudo range equations when the pseudo noise code boundary is less than 512 and an estimated range is R, a chip from the plurality of chips transmitted at T time C_k is received at the receiver as a chip C_j that is offset from an expected chip \hat{C}_j , and L_{chip} is a distance that the signal propagates in one chip time ($c/1.023e6 = 293.0522561$ m), is;

$$PR = R - (C_j - \hat{C}_j) L_{chip} .$$

12. The apparatus of claim 10, further comprising:

means for solving each of the pseudo range (PR) equations when the pseudo noise code boundary is greater than 511 and has an estimated range R, a chip from the plurality of chips transmit at T time C_k , received at the receiver as a chip C_j that is offset from an expected chip \hat{C}_j , and L_{chip} being a distance that the signal propagates in one chip time ($c/1.023e6 = 293.0522561$ m), is;

$$PR = R + \lfloor 1023 - (C_j - \hat{C}_j) \rfloor L_{chip} .$$

13. A machine-readable signal bearing medium containing instructions that cause a controller to perform a method for fast satellite acquisition, the method comprising:

- receiving at a receiver a signal generated at a plurality of GPS transmitters;
- identifying at least four pseudo noise codes in the signal at the receiver;

calculating time with a clock having an error of less than 0.5 ms relative to a GPS time;
 deriving at least four pseudo range equations from each of the at least four pseudo noise codes; and
 locating the receiver by solving the at least four pseudo range equations simultaneously.

14. The method of claim 13, further comprises:

solving each of the at least four pseudo range equations when the pseudo noise code boundary is less than 512 and an estimated range is R , a chip from the plurality of chips transmitted at T time C_k is received at the receiver as a chip C_j that is offset from an expected chip \hat{C}_j , and L_{chip} is a distance that the signal propagates in one chip time ($c/1.023e6 = 293.0522561$ m), is;

$$PR = R - (C_j - \hat{C}_j) L_{chip} .$$

15. The method of claim 13, further comprising:

solving each of the pseudo range (PR) equations when the pseudo noise code boundary is greater than 511 and has an estimated range R , a chip from the plurality of chips transmit at T time C_k , received at the receiver as a chip C_j that is offset from an expected chip \hat{C}_j , and L_{chip} being a distance that the signal propagates in one chip time ($c/1.023e6 = 293.0522561$ m), is;

$$PR = R + \lfloor 1023 - (C_j - \hat{C}_j) \rfloor L_{chip} .$$